FAA-P-2675
July 27, 1977

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
PURCHASE DESCRIPTION

EMERGENCY LOCATOR TRANSMITTER DIRECTION FINDER

1. SCOPE

1.1 Scope.- The equipment described herein is a portable radio Direction Finder (DF) to be used for homing on Emergency Locator Transmitter (ELT) signals at 121.5 MHz or 243 MHz.

2. APPLICABLE DOCUMENTS

2.1 FAA Standard.- The following FAA standard, of the issue specified in the invitation for bids, forms a part of this purchase description:

FAA-STD-013 Quality Control Program Requirements

2.2 Military Documents.- The following Military specification and standard, of the issue in effect on date of the invitation for bids or request for proposals, forms a part of this purchase description:

MIL-E-17555 Electronic and Electrical Equipment and Associated Repair Parts, Preparation for Delivery of

MIL-STD-454 Standard General Requirements for Electronic Equipment

MIL-STD-781 Reliability Tests; Exponential Distribution

(Copies of these specifications and the applicable FAA standard may be obtained from the Federal Administration, Washington, D.C. 20591).

Attention: Contracting Officer. Requests should fully identify material desired, i.e., specification numbers, dates, amendment numbers, complete drawing numbers; also, request should state the contract involved or other use to be made of the requested material).

(Single copies of Military specifications and standards may be requested by mail or telephone from U.S. Naval Supply Depot, 5801 Tabor Avenue, Philadelphia, Pennsylvania, 19120. For telephone requests, call 215/697-3321, 8:00 AM to 4:30 PM, Monday through Friday. Not more than five items may be ordered on a single request, and the Invitation for Bid or Contract Number should be cited where applicable).

3. REQUIREMENTS

3.1 Equipment to be furnished by contractor.- Each Direction Finder furnished by the contractor shall be complete in accordance with all the purchase description requirements and shall include:

Direction Finder with crystals
Headset
Antennas
Batteries
Transit case
Instruction Manual (two per equipment)

Commercial instruction manuals meeting the requirements of paragraph 3.19 shall be furnished in accordance with the contract schedule. A one part instruction manual shall cover all the equipments described herein which are furnished under the contract.

3.2 Operating environment conditions.-

Ambient temperature	-20°C to +50°C
Relative humidity	5% to 95%
Altitude	0 to 15,000 ft. above see level
Voltage	9V - 24V (12V preferred, but not required)

The equipment shall be capable of meeting all performance requirements specified herein under any combination of the conditions above, unless modified by other stated requirements herein.

3.3 General Functional Requirements.- The Direction Finder (DF) specified herein consists of a crystal-controlled superheterodyne portable hand-held receiver with antenna designed to provide homing capability in response to emission on the emergency locator frequencies. Emission from ELT's may be at a distance as when actuated by a crash impact or may be local as when actuated inadvertently at an airport.

3.4 Frequency Signals.- Each DF shall be capable of operating on 121.5 MHz and 243.0 MHz. Selection of the operating frequency shall be achieved by not more than a positive adjustment of the antenna and a single switch activation. Controls must be external and easily accessible to the operator.

3.5 Frequency Stability.- The crystal-controlled local oscillator frequency shall remain within ± 0.005% of the design center frequency for operation on the assigned frequency (3.4).

3.6 Receiver Sensitivity.- The overall receiver sensitivity shall be -115 dBm at 121.5 MHz and -100 dBm at 243.0 MHz. The test condition being a test carrier modulated 30% with a 1000 Hz sine wave signal. The $\frac{S+N}{N}$ ratio shall equal or exceed 10 dB at both frequencies.

3.6.1 Overloading.- Nearby, both physically and adjacent channel wise, 10 watt aircraft communication transmitters shall not overload the DF circuits to the extent that it cannot perform its function.

3.7 Image and I.F. Rejection.- The image rejection for the DF shall be at least 70 dB down and the IF rejection shall be at least 70 dB down at ± 100kHz.

3.8 I.F. Bandwidth.- The I.F. bandwidth shall not exceed 50 Khz at the 6db points.

3.9 Audio Output.- A loudspeaker shall be provided; and an audio output circuit at 8 ohms shall be provided. The audio signal level shall be controlled by a gain control which incorporates the ON-OFF switch.

3.10 R.F. Sensitivity Control.- A sensitivity control (external and easily accessible) shall be incorporated in the DF to provide operation over the range of input signals specified herein.

3.11 Output Meter(s).- An output meter(s) shall be provided from the R.F. or I.F. carrier signals. Circuit sensitivity shall be such that an input signal of -97 dBm max to the receiver will produce full scale meter deflection. The meter(s) shall provide both a left/right indication and a signal strength indication of received ELT signals, and shall be illuminated to permit viewing of the meter(s) for night operation. Illumination is to be controlled by a switch mounted in a position convenient to the operator.

3.12 Antenna Directivity.- The antenna(s) shall respond to ELT signals so that a maximum signal from the forward direction is the homing guide characteristic. The front to back ratio shall be not less than 15 dB at 121.5 MHz and 10dB at 243 MHz.

3.13 Battery Operation.- The equipment shall be capable of operating from an internal battery. The batteries shall be rechargeable from 60 Hz 117 VAC power. Nickel-cadmium batteries are preferred. Batteries shall provide continuous operation time of not less than 40 hours in the no signal mode, and at least 10 hours in the full signal mode. Only common easily obtainable batteries shall be used.

3.14 Battery Compartment.- A battery compartment shall be provided which is accessible without the use of special tools.

3.15 Case.- The case shall be rugged, small in size and light in weight. The case shall be weatherproof in such a manner as to prevent the entry of rain, snow, or blowing dust.

3.16 Transit Case.- The transit case shall be constructed of fiberglass reinforced plastic. It shall have carrying handles that fold flat when not in use. Form fitting foam cushionings, that fits the encasement of the DF, shall be provided to provide maximum protection against damage that otherwise would result from handling, dropping and crushing.

3.17 Weight.- The Direction Finder shall be designed for portability and shall weight not more than four pounds with batteries.

3.18 Size.- The Direction Finder shall be designed for hand held operation under field conditions.

3.19 Instruction Manual.- Commercial type instruction manuals shall be furnished in accordance with the contract schedule and shall contain as a minimum the following:

(a) Contractor's name and address
(b) Contractor's model number
(c) Guarantee clause
(d) Photograph of equipments
(e) General description
(f) Theory of operation
(g) Operating instructions
(h) Maintenance instructions
(i) Replaceable parts list
(g) Wiring and schematic diagrams

3.20 Interchangeability.- Each component of a given type shall be interchangeable physically and electrically with the corresponding component having the same reference designation and circuit position in all other equipments for the same type manufactured on the same contract. No equipment shall include a component which is not common to all other equipments.

3.21 Workmanship.- Workmanship shall be professional, equivalent to the best standard of the industry in every respect; and the Direction Finder shall be manufactured and processed so as to meet the requirements specified herein. Workmanship shall be in accordance with MIL-STD-454, Requirement 9, Workmanship.

3.22 Reliability.- The Direction Finder shall be tested for reliability using MIL-STD-781. The minimum acceptable MTBF is 10,000 hours.

3.23 Reliability Demonstration.- MIL-STD-781 test plan XXV, Test Level A-1 with a discrimination ratio of 3/1 and a risk or 30 percent shall be used by the contractor to demonstrate reliability. Test duration for this plan is 0.37 times the specified MTBF per unit and is equal to 3700 hours. To reduce test times not less than 10 units may be demonstrated for 370 hours nor more than 25 units for 148 hours. This is the minimum testing required provided no calibration failures have occurred. The reliability demonstration test procedures shall be submitted to the Government for approval. No calibration failures are allowed.

3.24 Failure Criteria.- Direction Finder integrity is the prime goal of the demonstration test rather than its capability to run continuously for a specified number of hours. Calibration failures are those which will allow the Direction Finder to indicate data which is outside of the specified tolerances. Functional failures are any failures which affect usability. Providing no failure pattern is established, a total of 5 functional failures will be permitted during the above reliability demonstration.

4. QUALITY ASSURANCE PROVISIONS

4.1 The provisions of FAA-STD-013 shall apply to insure a satisfactory quality assurance program and product conformance with the requirements of this purchase description.

4.2 General Inspection Provisions.- All tests and inspections to determine compliance with the electrical and mechanical requirements of the purchase description shall be made by the contractor and shall be subject to Government inspection. The term "Government inspection" as used herein, means that an FAA representative will witness the contractor's testing and inspection, and will carry out such visual and other inspection as deemed necessary to assure compliance with contract requirements. The Government reserves the right to waiver Government inspection at the contractor's plant.

4.2.1 Environment Test Conditions.- All acceptance testing shall be accomplished at standard operating conditions within the following:

Relative humidity	10 - 60%
Altitude	0 - 5000 ft
Ambient temperature	21 ± 5°C

4.3 Test Plan.- A test plan is required. It shall include proposed test data forms, test procedures and list of tests in accordance with FAA-STD-013, paragraph 2.2.1. Submission of copies and approval shall be in accordance with paragraph 2.2.2.

4.4 Test Data.- Submit data in accordance with FAA-STD-013, paragraph 2.2.2. For each Direction Finder, the contractor shall furnish test data complying with the approved test plan (4.3), describing the response or results obtained during the inspection and tests. Test data for all tests shall, where applicable, contain quantitative information. The test data must demonstrate that the Direction Finder meets contract requirements. The original test data form shall be signed by the contractor's test person and countersigned by the Government representative, if assigned (4.2); or, if Government inspection is waived, the test data shall include the statement, "This certifies that this unit shall fully meets all technical requirements of the contract," and shall be dated and signed by a responsible official of the contractor.

5. PREPARATION FOR DELIVERY

5.1 Preservation, packaging, and packing.- Preservation, packaging and packing shall be in accordance with MIL-E-17555, Level "C".

6. NOTES

6.1 Note on Information Items.- The contents of this section are only for the information of the initiator of the procurement requested and are not part of the requirements of this purchase description. They are not contract requirements nor binding on either the Government or the contractor. In order for these terms to become a part of the resulting contract, they must be specifically incorporated in the schedule of the contract. Any reliance placed by the contractor on the information in these subparagraphs is wholly at the contractor's own risk.

6.2 Available Commercial Equipment of High Quality.- It is the intent of the Government to purchase high quality commercially produced DF's of proven design.

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